CLINTON LABORATORIES
CENTRAL FILES NUMBER
44-10-257

A-670

#3040

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10/12/44

Date Discharge of Metal

Subject

J. F. Sinclair

By L. B. Emlet

To

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Central File
11-21-44

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10-18-44
100 Area

Mr. L. B. Emlet

J. P. Sinclair

Production

Discharge of Metal

Please begin the discharge of metal for use in the 200 Area again on Saturday, October 21, 1944. Discharge should be at the rate of 3 buckets of 264 slugs each every other day from October 21 on until further notice.

J. P. Sinclair

J. P. Sinclair
Production Superintendent

JPS/maw

CLASSIFICATION CANCELLED
DATE FEB 12 1964
For The Atomic Energy Commission
H. B. Carroll
Chief, Declassification Branch

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David R Hamrin 9/15/95
Technical Information Officer Date
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CENTRAL FILES NUMBER

44-9-180

#3010

A-670

File ~~Hra~~

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Date 9/9/44

Subject Metal Discharge Schedule

J. P. Sinclair

By L. B. Emlet

To ~~[illegible]~~

Copy 2 B. C. Nylen

~~1 Pritchard~~

~~2 [illegible]~~

~~3 [illegible]~~

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C. E. Story	9-14-44		
B. Middleton	9-15-44		
E. A. Pritchard	9-15-44		

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9-9-44

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L. B. Emlet

J. P. Sinclair

Metal Discharge Schedule

COPY

Attached is a tabulation showing expected use of material now in the canal, and schedule for discharge of material which it is estimated will be processed by December 31. Variations required in discharge dates in order to prevent interference with necessary operation will be satisfactory within the limits of plus or minus three days, but the preferred policy should be to leave the metal in the pile and approach 27 day aging rather than to discharge it too far ahead of schedule.

The 302 slugs in Bucket No. 29 should be reduced to 264 by transfer of 38 slugs to Bucket No. 49, and Bucket No. 49 which will then contain 200 slugs can be brought up to 264 as additional slugs become available, and used in one of the half ton batches to replace a bucket scheduled for discharge.

Please note that Bucket No. 26 discharged 9/5 and the eight buckets discharged 9/8 are to be held as nominal 60 day material for runs 252 - 260. Please note also that no pile discharge is scheduled for the periods 9/9 to 9/20 inc., and 9/28 to 10/16 inc., and that only one bucket needs to be discharged on 9/21.

J P Sinclair

J. P. Sinclair
Production Superintendent

JPS/maw

[redacted] information affecting the [redacted] ...e revelation of its contents in any manner to an unauthorized person is prohibited by law.

[redacted]

200 Area Run Nos.	Age--Days	Batch Size	Number of 264 Slug Buckets	Charge to Dissolver Date	Sept. 5 Bucket Number	Discharge from Pile Date
218, 219, 220	34	1/3 Ton	3	9/12	4, 11, 1	8/9
221, 222, 223	35	"	3	9/14	50,3, 54	8/9 & 10
224, 225, 226	35	"	3	9/16	32, 24, 19	8/10 & 14
227, 228, 229	60	"	3	9/28	64, 62, 6	7/29 & 8/1
230, 231, 232	59	"	3	9/30	53, 17, 60	8/1, 2 & 4
233, 234, 235	59	"	3	10/2	67, 15, 44	8/4
236, 237	70	1/2 Ton	3	10/13	10, 61, 12	8/4 & 5
238, 239	67	"	3	10/15	29, 23, 41	6/26 & 8/9
240, 241	85	"	3	10/17	43, 63, 56	7/24, 7/27, 8/2
242, 243	76	"	3	10/19	69, 58, 51	8/4
244, 245	78 & 30	"	3	10/21	47, 34 4	8/4, 9/21
246, 247	30	"	3	10/23	16 10 5	9/23
248, 249	30	"	3	10/25	65 26 18	9/25
250, 251	30	"	3	10/27	57 16 22	9/27
252, 253, 254	55	1/3 Ton	3	10/30	28 21 33	9/5 & 8
255, 256, 257	54	"	3	11/1	2 52 27	9/8
258, 259, 260	56	"	3	11/3	59 35 9	9/8
261, 262	30	1/2 Ton	3	11/16		10/17
263, 264	30	"	3	11/18		10/19
265, 266	30	"	3	11/20		10/21
267, 268	30	"	3	11/22		10/23
269, 270	30	"	3	11/24		10/25
271, 272	30	"	3	11/26		10/27
273, 274	30	"	3	11/28		10/29
275, 276	30	"	3	11/30		10/31
277, 278	30	"	3	12/2		11/2
279, 280	30	"	3	12/4		11/4
281, 282	30	"	3	12/6		11/6
283, 284	30	"	3	12/8		11/8
285, 286	30	"	3	12/10		11/10
287, 288	30	"	3	12/12		11/12
289, 290	30	"	3	12/14		11/14
291, 292	30	"	3	12/16		11/16
293, 294	30	"	3	12/18		11/18
295, 296	30	"	3	12/20		11/20
297, 298	30	"	3	12/22		11/22

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[redacted]

9-9-44

JPS/maw

Research Program Clinton C O

W. B Leslie

CENTRAL FILES NUMBER
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By Authority Of:
E J Murphy 1-8-63
M Shirley

For: H. T. Gray, Supervisor
Laboratory Records Dept.
ORNL

September 1, 1944

To: Section C-III

From: J.A. Swartout

Ref.: Daily Plant Reports
WCK from WCS

SUMMARY OF PLANT RUNS
Comparison of Clinton vs. Hanford with Scavengers

Run	Flow-sheet	F.P. Conc.	Extraction % Loss	Extraction γ dF	1st By-Product % Loss	1st By-Product γ dF	1st Product % Loss	1st Product γ dF	By-Product $BiPO_4$ % Loss	By-Product $BiPO_4$ γ dF	LaF_3(Prod) Cross-over % Loss	LaF_3(Prod) Cross-over γ dF	Overall: Canyon % Loss	Overall: Canyon γ dF	Remarks
154-158	Clinton	"X"	1.5	0.7_2	0.3	1.3	1.9	1.2	0.5	(-.7)	1.1	1.7	5.8	4.4	HF in LaF_3 prod. red. to 0.5N
159-161	"	"	1.3	0.7	0.6	1.6	1.1	0.8	0.8	(-.4)	1.3	1.8	4.9	4.1	1)Sep. tank for each step. 2)H_3PO_4 in $BiPO_4$ by-product red. to .02M
162-169	"	"	1.8	0.8	0.4	1.6	1.6	1.1	0.6	(-.3)	1.6	1.0	5.9	4.2_2	Ditto
170-177	Hanford	"W"	1.7	0.7_5	3.7	1.6_5	2.0	1.2	2.0	0	2.5	0.8_5	11.5	4.4_5	Ce-Zr Scav. $\left\{\frac{\text{1st strike}}{\text{Ce-Zr}}\ \frac{\text{2nd Strike}}{\text{Ce-Zr}}\right.$
178-185	"	"	4.0	0.7	3.6	1.6	3.0	1.1	2.4	(-.3)	2.1	0.9	15.1	4.0	Ditto and: 1) H_2SO_4 added to 40% UNH, 2) (178-182) 3 washes of 1st By-Product
186-193	"	"	2.9	0.8	3.7	1.6	2.3	1.3	2nd By-Prod. (Scav.)		2nd Prod. $BiPO_4$		Overall- 2 Cycles		
									4.4	0.1	2.1	1.4	15.3	5.2	2 - Dec. cycles 1st: Ce-Zr, Ce-Zr. 2nd: Ce-Zr, Ce-Zr.
194-201	"	"	2.4	0.8	2.9	1.5	1.0	1.2	3.0	0.5	0.8	1.4	10.1	5.4	2 - Dec. cycles 1st: Ce-Zr,Ce. 2nd: Ce-Zr,Ce.
202-209	"	"	2.0	1.0	3.3	1.2	0.7	1.5	0.7	0.1	0.2	1.6	7.0	5.4	2 - Dec. Cydes 1st: Ce-Zr, Ce. 2nd: By-Prod. / No scav. Prod. / 0.05M $(NH_4)_2SiF_6$

[redacted]

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CLINTON LABORATORIES

1. J. P. Sinclair
2. O. H. Greagor
3. W. C. Johnson
4. B. C. Nylen #3040
5. W. Q. Smith
6. W. Q. Smith
7. Central File
8. Reading File

DATE 9-7-44

CLASSIFICATION CANCELLED
DATE DEC 6 196
For The Atomic Energy Commission
[signature]
Chief, Declassification Branch

To J. P. Sinclair DEPARTMENT

FROM W. Q. Smith DEPARTMENT

CF-44-9-10

IN RE: Proposed 200 Area Operating Schedule

Attached is a proposed operating schedule for the 200 Area for Runs 218 - 268 inclusive. Two primary objectives dictated this arrangement: (1) Production of the maximum quantity of product by the end of October, and (2) continuation of 204 Building operation using a proposed Hanford procedure and Hanford size batches.

The pertinent features of this schedule are:

1. Three 1/3 ton batches will be metathesized together in Room D giving a Hanford size batch in Room D and 204 Building and Hanford quantities of lanthanum in the product precipitation step of the crossover (at present 50% more lanthanum is used than is on the Hanford flowsheet). The demonstration runs are then more conveniently broken down into a group of nine rather than a group of eight runs.

2. The supernatent from the peroxide precipitation will be reacted with $NaNO_2$ to destroy the peroxide and returned to supply lanthanum for the first by-product precipitation. In the present series this is being returned to the product precipitation step with the result that a third lanthanum precipitation must be made and this worked up separately in order to recover the product which is carried by the lanthanum not removed in the centrifugation. B. A. Fries has tested a similar procedure except that he used KNO_2 to destroy the peroxide and then re-oxidized the product before returning it to the system. This re-oxidation is not considered necessary since a permanganate re-oxidation step is now being carried out immediately before the lanthanum by-product precipitation. J. B. Sutton has agreed to test the effect of returning the $NaNO_2$ treated peroxide supernatant at this point in the process, on by-product and product waste losses in the crossover.

3. In order not to hold up operations while waiting for the return of the peroxide supernatant it will be necessary to have two recycle batches in the process. This will involve about 2½ grams of product in each if the solubility is 50 mg per liter. Batches 208 - 209 gave a solubility of 59 mg per liter and it is anticipated that at least this low a solubility can be obtained on future batches.

4. Following the demonstration runs with CeZr-CeZr in each cycle and 60 day metal 16 runs will be made using ½ ton batches and one cycle operation (with by-product lanthanum fluoride) in order to catch up on the schedule delay caused by the continuation of the two cycle operation. This will delay the 60 day runs on the ammonium fluosilicate plus scavengers until metal which will be pushed immediately has cooled 60 days.

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Technical Information Officer, ORNL Site Date

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W. Q. Smith
W. Q. Smith
[redacted]

WQS/maw

200 AREA SCHEDULE

Run Nos.	Age Days	Batch Size	Process First Cycle	Process Second Cycle	First Charge to Dissolver	Charge to Rm. D	Ready to Ship	Disch. from Pile	Zone No.	Prod. Disch.	Prod. Deliv.
218, 219, 220	30	1/3 Ton	CeZr-CeZr, SiF_6	SiF_6	Sept. 12	Sept. 26	Sept. 30	8-9 to			
221, 222, 223	30	"	"	"	Sept. 14	Sept. 28	Oct. 2	8-14		13.8	
224, 225, 226	30	"	"	"	Sept. 16	Sept. 30	Oct. 4				
227, 228, 229	62	1/3 Ton	CeZr-CeZr	CeZr-CeZr	Sept. 28	Oct. 12	Oct. 16	7-29 to			
230, 231, 232	60	"	"	"	Sept. 30	Oct. 14	Oct. 18				
233, 234, 235	61	"	"	"	Oct. 2	Oct. 16	Oct. 20	8-4		12.6	
236, 237		1/2 Ton	Straight Bi	None	Oct. 13	Oct. 18	Oct. 22	[illegible]		4.0 [redacted]	
238, 239		"	"	"	Oct. 15	Oct. 20	Oct. 24	8-[illegible]		4 [redacted]	
240, 241		"	"	"	Oct. 17	Oct. 22	Oct. 26				
242, 243		"	"	"	Oct. 19	Oct. 24	Oct. 28	9-18	1	10.[redacted]	
244, 245		"	"	"	Oct. 21	Oct. 26	Oct. 30	9-21	10-1/2	5.[redacted]	
246, 247		"	"	"	Oct. 23	Oct. 28	Nov. 1				
248, 249		"	"	"	Oct. 25	Oct. 30	Nov. 3	9-24	3	10.5 [redacted]	
250, 251		"	"	"	Oct. 27	Nov. 1	Nov. 5	9-27	11-1/2	5.3 [redacted]	
252, 253, 254	57	1/3 Ton	Best Comb.	SiF_6	Oct. 30	Nov. 14	Nov. 18	9-5 to			
255, 256, 257	59	"	"	"	Nov. 1	Nov. 16	Nov. 20		2	9.8	
258, 259, 260	61	"	"	"	Nov. 3	Nov. 18	Nov. 22	9-9	10-1/2	4.7	
251, 262		1/2 Ton	Straight Bi	None	Nov. 16	Nov. 20	Nov. 24				
263, 264		"	"	"	Nov. 18	Nov. 22	Nov. 26	10-18	4	14.7	
265, 266		"	"	"	Nov. 20	Nov. 24	Nov. 28	10-21	11-1/2	7.2	
267, 268		"	"	"	Nov. 22	Nov. 26	Nov. 30	10-24	9-1/2	7.4	
					Nov. 24	Nov. 28	Dec. 2	10-24	9-1/2	7.4	
					26	Nov. 30	4				
					28	Dec. 2	6	10-28	7	15.5	
					30	4	8				
					Dec. 2	6	10	11-1	5	16.3	
					4	8	12				
					6	10	14	11-5	8	16.8	
					8	12	16				
					10	14	18	11-9	6	17.6	
					12	16	20				
					14	18	[illegible]	[illegible]	12	17.6	
					16	20	[illegible]				
					18	22	[illegible]	[illegible]	13	17.3	
					20	24					

9-7-44

WQS/maw

A-670 Fagerbaugh

CLINTON LABORATORIES
CENTRAL FILES NUMBER
44-9-50

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Date 9/2/44

Subject (Classified Notebooks and Other Materials at Clinton Lab. to be made Available NEW)

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By W. E. Kirst

To M. D. Whitaker

RECEIVED SEP 2 1944 R. L. DOAN

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6. Wilmington Subject
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9. Clinton TNX Chronological

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WILMINGTON, DELAWARE

Explosives Department - TNX

CLASSIFICATION CANCELLED
DATE DEC 6 1963
For The Atomic Energy Commission
Chief, Declassification Branch

September 2, 1944

M. D. Whitaker, Director
Clinton Laboratories
Knoxville, Tennessee

Attention: R. L. Doan

OK for mail 9-21

It is requested that the following information now at Clinton Laboratories be made available to Hanford Engineer Works.

NOTEBOOKS AND OTHER MATERIAL

Clinton Lab. Notebook #	Assigned to	From Page #	To Page # (Incl.)

- **Folder S-I & S-III M. F. Acken 2 copies**
- **Semi-monthly reports of Separations Development Division**
- **Folder- Recommendations for plant procedures**
- **Problem Assignment Reports, S-I, S-II & S-III sections**
- **Folder - 205 Area Reports, W. Q. Smith to W. C. Kay**
- **$BiPO_4$ report, W. F. Underwood**
- **Recommendations for process conditions at Hanford - Report B. C. Nylen to W. C. Kay**
- **Memo - Plant dummy scavenger runs, 7-12-44, B. C. Nylen to W. C. Kay**
- **Clinton cell procedures (runs 186-193)**
- **Clinton concentration procedures and Room D solution make-up**
- **Semi-works handbook**
- **Semi-works standard procedures**
- **Hanford flowsheet (9-1-44), J. B. Work**
- **Notebook - CL-326 (R. H. Beaton notes)**
- **Notebook - CL-479 (R. H. Beaton notes)**
- **Folder - S-II semi monthly report file (R. H. Beaton copies)**
- **Folder - Plant test correspondence (R. H. Beaton copies)**
- **Report - CL-1305, Clinton lecture notes (R. H. Beaton copy)**
- **Folders - adsorption test data (R. H. Beaton copies)**
- **Semi works extraction-decontamination procedure (R. H. Beaton copies)**

Not mailed yet

Suggested by: **M. F. ACKEN**

[redacted]

Sincerely yours,
EXPLOSIVES DEPARTMENT - TNX

W. E. Kirst

W. E. KIRST

~~Bothwell~~

#3040

Date 10-21-44

File IV F3

Subject Summary of Runs 227 - 235 Through Isolation

Copy # 6 - S. G. English

By W. Q. Smith

To J. P. Sinclair

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14. W. O. Simon
15. W. O. Simon
16. R. E. DeRight
17. R. E. DeRight
18. H. Worthington
19. G. W. Struthers
20. M. D. Whitaker
21. M. D. Whitaker
22. M. D. Whitaker
23. C. M. Cooper
24. T. R. Hogness
25. T. R. Hogness
26. Reading File
27. Central File

October 21, 1944

To: Mr. J. P. Sinclair Department: Production

From: W. Q. Smith Department: Production

In re: Summary of Runs 227 - 235 Through Isolation

Run Number	1 - 235	227 - 235
% Yield	83.7	70.9*
% Waste	14.4	21.6
% Material Balance	98.1	92.5

*Corrected for loss in product content of recycle solutions on hand.

SUMMARY

This nine-run series was processed according to the same procedure used on the previous series (Hanford procedure with recycling of isolation supernatants) with the exception that Ce-Zr; Ce-Zr scavengers were used in both decontamination cycles with no $(NH_4)_2SiF_6$. With the completion of these runs, sufficient plant-scale data have been obtained on the performance of scavengers and the complexing agent $(NH_4)_2SiF_6$, to lead to the conclusion that using $(NH_4)_2SiF_6$ with no scavengers in the decontamination cycles will reduce waste losses by a factor of five. Furthermore from plant data it appears that sufficient decontamination for Hanford level of operation can be obtained under these conditions. Comparison of the combinations tested in the plant is given in the discussion with data to support the above conclusions.

The flowsheet amount of $NaNO_2$ (0.1M) was used for pre-extraction treatment in this series. Extraction waste losses averaged 1.9%, slightly lower than results obtained previously with this concentration.

Decomposition of H_2O_2 in isolation recycles with $NaNO_2$ has given no trouble. The amount of $NaNO_2$ necessary has increased to about 80% of the stoichiometric amount and the temperature rise has been 10 - 12° C. over an addition period of about one hour.

The first peroxide precipitation solubilities in the series were 119, 83 and 89 mg per liter. Table on page 3 shows the variables which may affect these solubilities. The final peroxide precipitation solubilities were 16 and 53 mg per liter. For the purpose of this and subsequent reports the solubility is obtained by dividing the product content of the decanted supernatant plus washes by the volume of solution in liters at the time the precipitation is made.

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3. B. C. Nylen	12. E. J. Murphy	21. M. D. Whitaker
4. W. C. Johnson	13. W. Q. Smith	22. M. D. Whitaker
5. R. L. Doan	14. W. O. Simon	23. C. M. Cooper
6. S. G. English	15. W. O. Simon	24. T. R. Hogness
7. C. D. Coryell	16. R. E. DeRight	25. T. R. Hogness
8. G. E. Boyd	17. R. E. DeRight	26. Reading File
9. M. D. Peterson	18. H. Worthington	27. Central File

October 21, 1944

To: Mr. J. P. Sinclair — Department: Production

From: W. Q. Smith — Department: Production

In re: Summary of Runs 227 - 235 Through Isolation

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% Yield	83.7	70.9*
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*Corrected for loss in product content of recycle solutions on hand.

CLASSIFICATION CANCELLED
DATE FEB 12 3 4
For The Atomic Energy Commission
H. F. Carroll
Chief, Declassification Branch

This nine-run
used on the previo
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[redacted] Run Summaries

Run numbers	227	228	229	230	231	232	233	234	235
Date Started	9-28	9-28	9-29	9-30	10-1	10-1	10-3	10-3	10-4
Age of Metal in days	62	62	60	61	61	58	60	60	61
Gamma counts per gram UNH x 10^6	1.37	1.44	1.42	1.72	1.23	1.10	1.15	1.29	0.91

Yield

Run Number	227-235	227	228	229	230	231	232	233	234	235
% Orig. prod. in extr. ppt. 24P	87.1	90.1	95.8	86.8	87.3	87.5	88.5	94.5	69.6	81.7
% Orig. prod. after 1st by-prod. ppt. 51R	100.2	98.9	104.1	116.1	95.7	101.2	98.6	102.8	92.2	93.7
% Orig. prod. in 1st prod. ppt. 54P	88.8	88.0	94.7	83.1	87.6	88.3	--	90.0	87.9	91.0
% Orig. prod. after 2nd by-prod. ppt. 41R	89.6	88.9	92.5	91.5	86.9	95.1	86.0	96.5	85.9	84.0
% Orig. prod. in 2nd prod. ppt. 44P	88.8	84.3	88.5	81.1	102.0	86.2	81.4	85.6	105.4	81.3
% Orig. (Aver.) prod. in 2nd prod. ppt. 154P	85.5	89.0	84.3	84.8	81.3	91.3	100.2	80.0	85.7	73.1
Basis after return of recycle ½ DBP + Ave. 11M*	200.0	100	271.7	271.7	100	218.8	218.8	100	257.6	257.6
% Prod. after LaF_3 by-prod., recycle basis: 151R	88.1	93.0	--	--	69.0	94.0	86.0	86.3	88.9	85.0
% Prod. in sol. of LaF_3 pr. slurry D1P	89.2		86.0			94.8			87.9	
% Orig. prod. in final peroxide ppt. 1FP**	70.9									

Material Balance

Run Number	227-235	227	228	229	230	231	232	233	234	235
Through 1st by-prod. ppt. 51R	105.5	105.4	108.7	121.6	101.6	106.7	104.5	107.6	97.4	97.4
Through 2nd by-prod. ppt. 41R	101.3	102.8	104.3	103.2	98.6	106.7	98.9	107.0	96.4	92.4
Through decont. cycles 44P	101.4	100.0	102.7	93.5	114.1	98.7	95.0	98.7	117.5	90.7
Through final peroxide ppt. 1FP**	92.5									

*151R and D1P for runs containing recycled product are based on the average value of the 11M plus the amount of recycled product added.

**Corrected for gain in product content of recycle solutions on hand and based on total 11M.

[redacted]

Measured Losses

Run Numbers	227-235	227	228	229	230	231	232	233	234	235
Extr. ppt. effluent 23MS	1.9	3.2	1.2	1.3	1.8	1.5	2.4	1.2	2.5	1.5
1st by-product cake 71-BP-1	3.4	3.1	3.3	4.2	4.1	4.0	3.6	3.6	2.7	2.2
1st prod. ppt. effluent 53WS	2.3	4.0	2.1	2.1	1.8	2.2	3.0	1.7	1.7	1.0
2nd by-prod. cake 71-BP-2	4.0	3.6	5.7	4.0	4.0	3.8	3.9	4.0	3.7	3.8
2nd prod. ppt. effluent 43WS	1.0	1.9	1.2	0.8	0.5	0.9	0.6	0.7	0.9	1.0
3rd by-product cake 71-BP-3	0.9	1.8	1.1	0.8	0.9	0.7	0.9	0.8	0.5	0.4
LaF_3 by-product cake 71-BP-4*	1.3	2.4	0.9	1.0	1.1	1.7	1.7	1.5	1.2	1.0
LaF_3 product ppt. effluent 153WS*	1.5	2.3	0.4	1.3	0.4	1.1	2.7	0.5	2.4	1.9
1st metathesis liquor D3CW*	0.7		1.0			0.9			0.2	
1st metathesis wash D3WW*	0.4		0.5			0.5			0.3	
Total 205 Building (Basis 11M)	21.4									

Gamma dF's

Run Numbers	227-235	227	228	229	230	231	232	233	234	235
Through extr ppt. 24P	0.9	0.8	1.0	1.7	0.9	0.8	0.7	0.9	0.9	0.8
Through 1st by-pr. ppt. 51R	2.4	2.5	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4
Through 1st prod. ppt. 54P	3.7	3.4	3.5	3.5	3.6	4.1	3.5	3.5	3.8	3.8
Through 2nd by-prod. ppt. 41R	4.4	4.2	4.7	3.9	4.6	4.4	4.7	4.3	4.2	---
Through 2nd prod. ppt. 44P	5.8	5.5	5.7	5.9	5.9	6.5	5.7	5.3	5.7	5.9
Through 2nd prod. ppt. (composite) 45P	5.8									
Through 2nd prod. ppt. D1-S	7.4		7.2			7.4			7.5	

Factors Affecting Peroxide Solubility

Run Numbers	Fe (M)	Zr (M)	Acidity (N)	H_2O_2 (%)	Settling Time	Solubility** mg/liter
227-228-229	0.0067	0.00006	0.8	9.5	9 hrs.	119
230-231-232	0.0065	Nil	0.7	8.6	20 hrs.	83
233-234-235	0.0063	Nil	0.8	8.3	15 hrs.	89

*BP-4, 153WS, D3CW and D3WW for runs contianing recycled product are based on the average value of the 11M plus the amount of recycled product added.

**Value after decanting and washing.

[redacted]

With the completion of this series of runs the final demonstration of the recommended Hanford process has been made. Results confirm that the recommended process will give adequate decontamination. Waste losses, however, although they may not be considered excessive, have averaged five times as great with the Ce-Zr; Ce-Zr scavenger as with ammonium fluosilicate (no scavenger) in the cycles. It has been predicted that at Hanford concentrations the losses will be somewhat less but there seems to be no reason for doubting that they could not be lowered by the same factor of five by omitting scavengers. At Clinton the yield loss for two cycles is 9.4% greater with Ce-Zr; Ce-Zr, than with $(NH_4)_2SiF_6$ alone in both cycles. (Waste losses were 5.9% per cycle with Ce-Zr; Ce-Zr scavengers, average of 64 results, and 1.2% per cycle with $(NH_4)_2SiF_6$, average of 16 results. See table below.)

Run Nos.	Scavengers First Cycle	Scavengers Second Cycle	dF Thru 2 Cycles 45P	dF Thru Cross-Over D1-S	To Waste 1st Cycle	% Waste 2nd Cycle
194-201	Ce-Zr; Ce	Ce-Zr; Ce	5.3	6.7	3.9	3.8
202-209	Ce-Zr; Ce	$(NH_4)_2SiF_6$	5.3	7.1	4.0	.9
218-226	(Ce-Zr; Ce-Zr / $(NH_4)_2SiF_6$)	$(NH_4)_2SiF_6$	5.7	7.4	4.5	1.5
186-193	Ce-Zr; Ce-Zr	Ce-Zr; Ce-Zr	5.6	6.9	6.0	6.5
210-217	Ce-Zr; Ce-Zr	Ce-Zr; Ce-Zr	5.8	7.0	6.9	4.7
227-235	Ce-Zr; Ce-Zr	Ce-Zr; Ce-Zr	5.8	7.4	5.7	5.0

No Clinton plant runs have been made with fission products, and with ammonium fluosilicate but without scavengers in both of the cycles. However, based on the results obtained to date it appears that the omission of scavengers but inclusion of ammonium fluosilicate will give decontamination factors of greater than 10^5 before the cross-over and greater than 10^7 after the cross-over. Thus the comparison of runs with Ce-Zr; Ce in the 2nd cycle vs those with $(NH_4)_2SiF_6$ alone in the 2nd cycle (Ce-Zr; Ce in the first cycle of both series) favors the complexing agent. (dF was 5.3 on both at end of 2nd cycle, 7.1 with $(NH_4)_2SiF_6$ vs. 6.7 with Ce-Zr; Ce at end of the cross-over.) A similar comparison with Ce-Zr; Ce-Zr scavengers but in this case with $(NH_4)_2SiF_6$ also in the first cycle when omitting the scavenger from the second, does not give as clear-cut a case, but still favors the complexing agent. (dF's were 5.7 and 7.4 with $(NH_4)_2SiF_6$ in 2 cycles, Ce-Zr; Ce-Zr in one vs. 5.74 and 7.2 with Ce-Zr; Ce-Zr in both cycles.) Since the improvement does not show up until after the cross-over it appears that ammonium fluosilicate is more effective in removing specific activities which are not readily removed in the cross-over than are the scavengers. Unfortunately this point cannot be checked by analyses for specific fission products since the activity after the cross-over is too low. Since all laboratory comparisons of scavengers vs. ammonium fluosilicate were only carried through the two cycles and since laboratory centrifuging tends to increase the effectiveness of scavengers, but not of ammonium fluosilicate, it is not inconsistent that laboratory results favored the scavengers.

In comparing the decontamination results the effect of cooling time has not been considered. This is permissible since the elements which control decontamination, Cb, Zr and La, make up the same fraction of total gamma activity at 60 days (77%)* as at 30 days (73%).*

Actual measurements have been made on radiation during the product isolation steps and during the cross-over steps to check on the decontamination required at Hanford when processing material at full product levels. A factor of 10^7 at the end of the cross-over seems to be adequate, but not overly conservative. At the end of the two decontamination cycles, the greatest radiation is obtained in the vicinity of the 10N HNO_3 solution. Readings in the vicinity of this tank corrected to the case where the operator is at a distance of ten feet and is protected by 1 foot of concrete indicate that a factor of only 1.5×10^4 is required to reduce radiation to .01 mr/8 hours. Under these conditions an operator could spend 5 minutes within 1 foot of the tank when it contains a charge without exceeding his daily dose. This has a bearing on the choice of decontamination procedure since it indicates that the factor of 10^7 at the end of the cross-over should be controlling and 10^5 at the end of the 2 cycles is not a justifiable limit.

Summarizing, it is certain that waste losses can be decreased appreciably by omitting scavengers and it appears very likely that adequate decontamination (greater than 10^7 after the cross-over) can be obtained with ammonium fluosilicate alone.

W Q Smith

W. Q. Smith

WQS/maw

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*From data by Lane and Brady CC 829.

This document consists of 3 pages and 0 figures. No. 1 of 3 copies, Series A

[redacted]

CLINTON LABORATORIES

1. M. D. Whitaker
2. S. W. Pratt
3. J. P. Sinclair

#3840

DATE September 8, 1944

TO M. D. Whitaker DEPARTMENT

FROM J. P. Sinclair DEPARTMENT

IN RE: Revised Production Schedule

FILE COPY

CLINTON LABORATORIES CENTRAL FILES NUMBER 44-9-157

Attached is a revised schedule of production for the 200 Area based on memo from W. Q. Smith to J. P. Sinclair of 9-7-44 on Proposed 200 Area Operating Schedule. The latter was discussed and recommended for your approval in a meeting of the Steering Committee yesterday.

You will note that the schedule includes only material to be finally isolated ready for delivery by December 31, and that the discharge schedule for material from the pile therefore ends on November 22. By the revised schedule 28 tons will be discharged from the pile in the period September 5 to November 22, instead of 32 tons in the period September 27 to November 30 shown in the schedule of August 25.

Assumptions made in preparation of the revised schedule are the same as those used in the schedule of August 25, except that 250° maximum metal temperature until November 22 has been definitely planned on, and allowance for decrease to 57,000 KWH/day from 62,000 KWH/day has been included for a fifteen day period during the reinstallation of the large No. 2 fan.

In order to follow the process outlined in Smith's memo, an expenditure of perhaps $3,000 may be required for equipment changes in 204 Building. A request for a project is now being drawn up, and emergency approval will be requested. This contingency was not forseen because the recommendation for the proposed process arose from the experimental work now in progress with Runs 202 - 217.

CLASSIFICATION CANCELLED
DATE DEC 6 196[illegible]
For The Atomic Energy Commission
[illegible]
Chief [illegible]

J. P. Sinclair
J. P. Sinclair
Production Superintendent

JPS/maw

[redacted]

Run Nos.	Age Days	Batch Size	Process First Cycle	Process Second Cycle	First Charge to Cell 1 Date	Charge to Room D Date	Charge Ready to Ship Date	Discharge from Pile Date	Pile Zone No.	Product Disch'gd from Pile	Product Delvr'd 80% Yield Basis	Total Product Delvr'd for Month	J.P.S. Est. of 8/25/44	W.C.K. Est. of 6/13/4[illegible]
202--209	30	1/3 Ton	CeZr, Ce	SiF_6	8/12	8/28	9/20			13.6	10.9			
210--217	30	1/3 Ton	CeZr, CeZr	CeZr, CeZr	8/27	9/11	9/20			12.5	10.0	SEPTEMBER 20.9	20.9	50
218--220	34	1/3 Ton	CeZr, CeZr, SiF_6	SiF_6	9/12	9/26	9/30	8/9		4.6	3.7			
221--223	35	"	"	"	9/14	9/28	10/2	8/9&10		4.7	3.8			
224--226	35	"	"	"	9/16	9/30	10/4	8/10&14		4.5	3.6			
227--229	60	1/3 Ton	CeZr, CeZr	CeZr, CeZr	9/28	10/12	10/16	7/29&8/1		4.8	3.8			
230--232	59	"	"	"	9/30	10/14	10/18	8/1,2&4		4.2	3.4			
233--235	59	"	"	"	10/2	10/16	10/20	8/4		3.6	2.9			
236, 237	70	1/2 Ton	Straight Bi	None	10/13	10/18	10/22	8/4&5		4.0	3.2			
238, 239	67	"	"	"	10/15	10/20	10/24	6/26&8/9		4.4	3.5			
240, 241	30	"	"	"	10/17	10/22	10/26	9/17	1	5.4	4.3			
242, 243	30	"	"	"	10/19	10/24	10/28	9/19	1	5.4	4.3			
244, 245	30	"	"	"	10/21	10/26	10/30	9/21	10	5.4	4.3	OCTOBER 40.8	18.7	52
246, 247	30	"	"	"	10/23	10/28	11/1	9/23	3	5.2	4.1			
248, 249	30	"	"	"	10/25	10/30	11/3	9/25	3	5.3	4.2			
250, 251	30	"	"	"	10/27	11/1	11/5	9/27	11	5.3	4.2			
252--254	55	1/3 Ton	Best Comb.	SiF_6	10/30	11/14	11/18	9/5&8	2	4.9	3.9			
255--257	54	"	"	"	11/1	11/16	11/20	9/8	2	4.9	3.9			
258--260	56	"	"	"	11/3	11/18	11/22	9/8	10	4.7	3.8			
261, 262	30	1/2 Ton	Straight Bi	None	11/16	11/20	11/24	10/17	4	7.3	5.8			
263, 264	30	"	"	"	11/18	11/22	11/26	10/19	4	7.4	5.9			
265, 266	30	"	"	"	11/20	11/24	11/28	10/21	11	7.2	5.7			
267, 268	30	"	"	"	11/22	11/26	11/30	10/23	9	7.4	5.9	NOVEMBER 47.4	58.9	55
269, 270	30	"	"	"	11/24	11/28	12/2	10/25	9	7.4	5.9			
271, 272	30	"	"	"	11/26	11/30	12/4	10/27	7	7.7	6.2			
273, 274	30	"	"	"	11/28	12/2	12/6	10/29	7	7.8	6.2			
275, 276	30	"	"	"	11/30	12/4	12/8	10/31	5	8.1	6.5			
277, 278	30	"	"	"	12/2	12/6	12/10	11/2	5	8.2	6.6			
279, 280	30	"	"	"	12/4	12/8	12/12	11/4	8	8.4	6.7			
281, 282	30	"	"	"	12/6	12/10	12/14	11/6	8	8.4	6.7			

Run Nos.	Age Days	Batch Size	Process: First Cycle	Process: Second Cycle	First Charge to Cell 1 Date	Charge to Room D Date	Charge Ready to Ship Date	Discharge from Pile Date	Pile Zone No.	Product Disch'gd from Pile	Product Delvr'd 80% Yield Basis	Total Product Delvr'd for Month	J.P.S. Est. of 8/25/44	W.C.K. Est. of 6/13/44
283, 284	30	1/2 Ton	Straight Bi	None	12/8	12/12	12/16	11/8	6	8.8	7.0			
285, 286	30	"	"	"	12/10	12/14	12/18	11/10	6	8.8	7.0			
287, 288	30	"	"	"	12/12	12/16	12/20	11/12	12	8.8	7.0			
289, 290	30	"	"	"	12/14	12/18	12/22	11/14	12	8.8	7.0			
291, 292	30	"	"	"	12/16	12/20	12/24	11/16	13	8.6	6.9			
293, 294	30	"	"	"	12/18	12/22	12/26	11/18	13	8.7	7.0			
295, 296	30	"	"	"	12/20	12/24	12/28	11/20	14	8.3	6.6	DECEMBER		
297, 298	30	"	"	"	12/22	12/26	12/30	11/22	14	8.4	6.7	100.0	99.9	62

September 8, 1944

JPS/maw

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CLINTON LABORATORIES

#3040

P. O. BOX 1991

KNOXVILLE 11, TENNESSEE

1 - E. J. Murphy
2 - A. H. Compton
3 - M. D. Whitaker

September 2, 1944 44-9-542

Production

FILE COPY

The District Engineer
U. S. Engineer Office
Manhattan District
P. O. Box E
Oak Ridge, Tenn.

Attention: Major E. J. Murphy

Dear Sir:

The data which you have requested for your monthly report for August 1944 are given below:

(a)	Tons of slugs placed in production pile during August	9.57
(b)	Tons of slugs removed from production pile during August	9.59
(c)	Anticipated product delivery during September	22 g
(d)	Number of batches processed through Bldg. 205 during August	16
(e)	Number of research problems completed during August	8
(f)	Total number of Clinton Laboratories employees as of August 31, 1944	1443

Very truly yours,

M. D. WHITAKER, DIRECTOR
CLINTON LABORATORIES

MDW/er

This document has been approved for release
to the public by:

David R Hamrin 9/15/95
Technical Information Officer Date
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or the revelation of its contents in [redacted] to
an unauthorized person is prohibited by law. [redacted]

44-9-469

A-670

44-9-469

File

Those Eligible
To Read the
Attached

Date

Subject
9/29/44

Revised Metal Discharge Schedule

By

To
Sinclair

Copy

Central File
11-21-44

Before reading this document, sign and date below

Name	Date	Name	Date
F. R. Smith	9/29/44		

FILE COPY

1. L. B. Emlet
2. B. C. Nylen
3. W. Q. Smith
4. J. P. Sinclair
5. Reading File
6. Central File

L. B. Emlet — 9-29-44 — Production

J. P. Sinclair — Production

Revised Metal Discharge Schedule
Ref: Memo J. P. Sinclair to L. B. Emlet - 9/9/44

Confirming our conversation this morning please arrange to discharge from the pile during the next few days an additional nine buckets of 264 slugs each. This discharge is required to prevent possibility of there being no properly aged metal available during the last week of October in case of improvement of the schedule given in the memo of 9/9/44. The situation will be reviewed again about October 15 with a decision to be made at that time on whether discharge will start again on October 17 as shown in the memo of 9/9/44 or whether the beginning of discharge will be delayed beyond October 17 because of improbable use of the subject nine buckets during the last week of October.

Please take advantage of this nine bucket discharge to abandon thermocouples no longer of great use at the outer edges of the pile, and to use the thermocouple plugs so obtained to increase the number of thermocouples in the hot ring outside the poison in order to obtain more information on temperatures in this region.

J. P. Sinclair
J. P. Sinclair
Production Superintendent

JPS/maw

CLINTON LABORATORIES
CENTRAL FILES NUMBER
44-10-236
#3040

~~Practice~~

Date 10-17-44

Subject Summary of Runs 218 - 226 Through Isolation

By W. Q. Smith

To J. P. Sinclair

File IV F 3

Copy # 6 - S. G. English

FILE COPY

Before reading this document, sign and date below.

R W Stoughton 10/19/44

S G English 11-2-44

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David R Hamrin 9/15/95
Technical Information Officer
ORNL Site
Date

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1. J. P. Sinclair
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3. B. C. Nylen
4. W. C. Johnson
5. R. L. Doan
6. S. G. English
7. C. D. Coryell
8. C. E. Boyd
9. M. D. Peterson
10. M. C. Leverett
11. E. J. Murphy
12. E. J. Murphy
13. W. Q. Smith
14. W. O. Simon
15. W. O. Simon
16. R. E. DeRight
17. R. E. DeRight
18. Hood Worthington
19. G. W. Struthers
20. M. D. Whitaker
21. M. D. Whitaker
22. M. D. Whitaker
23. C. M. Cooper
24. T. R. Hogness
25. T. R. Hogness
26. Reading File
27. Central File

October 17, 1944

To: Mr. J. P. Sinclair Department: Production

From: W. Q. Smith Department: Production

In re: Summary of Runs 218 - 226 Through Isolation

Run Number	1 - 226	218 - 226
% Yield	85.0	87.6*
% Product to waste	13.7	13.8
% Material balance	98.7	101.4

*Corrected for gain in product content of recycle solutions on hand.

SUMMARY

Demonstration of the Hanford process was continued with this series of runs, using the Hanford quantity of lanthanum in the cross-over product precipitation (two thirds of the amount previously used at Clinton) and combining 3 runs for $KOH-K_2CO_3$ metathesis, thus giving compositions and volumes of solutions from the metathesis step through isolation which were the same as those for Hanford. The supernatants from the peroxide first precipitations were recycled into the cross-over cycle at the by-product precipitation step after decomposition of the peroxide with sodium nitrite. Waste losses in the LaF_3 by-product and product precipitation steps on the runs containing recycled product averaged about 1% higher than normal. Details of the recycling procedure are given in the discussion.

Extraction waste studies were continued using various $NaNO_2$ concentrations. From the results obtained, it appears that lower concentrations than are now used may be desirable.

The scavenger combination on this series was Ce-Zr; Ce-Zr, $(NH_4)_2SiF_6$ in the first cycle and $(NH_4)_2SiF_6$ alone in the second cycle. Excellent decontamination was obtained (dF = 7.4 through the cross-over) while waste losses (decontamination cycles only) were 6.0%. Comparison with other combinations is given in the discussion and tables.

Slightly higher peroxide solubilities were encountered on these runs than on the first runs with this procedure with no apparent explanation having been found as yet.

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1.	J. P. Sinclair	10.	M. C. Leverett	19.	G. W. Struthers
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3.	B. C. Nylen	12.	E. J. Murphy	21.	M. D. Whitaker
4.	W. C. Johnson	13.	W. Q. Smith	22.	M. D. Whitaker
5.	R. L. Dean	14.	W. O. Simon	23.	C. M. Cooper
6.	S. G. English	15.	W. O. Simon	24.	T. R. Hogness
7.	C. D. Coryell	16.	R. E. DeRight	25.	T. R. Hogness
8.	C. E. Boyd	17.	R. E. DeRight	26.	Reading File
9.	M. D. Peterson	18.	Hood Worthington	27.	Central File

October 17, 1944

To: Mr. J. P. Sinclair Department: Production

From: W. Q. Smith Department: Production

In re: Summary of Runs 218 - 226 Through Isolation

Run Number	1 - 226	218 - 226
% Yield	85.0	87.6*
% Product to waste	13.7	13.8
% Material balance	98.7	101.4

*Corrected for gain in product ...

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DATE FEB 12 64
For The Atomic Energy Commission
H. F. Carroll
Chief, Declassification Branch

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Yield

Run Number	218-226	218	219	220	221	222	223	224	225	226
% Orig. prod. in extr. ppt. 24P	95.3	88.0	99.0	104.0	93.6	100.6	98.8	88.4	88.4	104.3
% Orig. prod. after 1st by-prod. ppt. 51R	100.6	98.7	102.8	115.0	97.4	102.5	105.6	95.2	93.1	101.4
% Orig. prod. in 1st prod. ppt. 54P	92.1	88.0	97.0	94.8	89.3	100.1	98.9	90.3	84.6	90.8
% Orig. prod. after 2nd by-prod. ppt. 41R	97.1	86.4	121.7	99.5	86.4	103.6	106.6	80.9	102.5	94.4
% Orig. prod. in 2nd prod. ppt. 44P	92.9	98.4	101.0	70.1	101.6	99.7	97.9	86.6	88.3	88.5
% Orig. (Aver.) prod. in 2nd prod. ppt. 154P	95.3	101.9	98.2	106.0	102.1	108.1	99.9	96.8	82.3	73.5
Basis after return of recycle $\frac{1}{2}$ D8P + Ave. 11M*	153.2	100	100	100	100	176.2	176.2	100	263.4	263.4
% Prod. after LaF_3 by-prod., recycle basis: 151R	94.2	99.9	89.6	89.2	102.4	84.6	98.8	104.6	97.2	90.5
% Prod. in sol. of LaF_3 pr. slurry D1P	89.1		105.4			88.7			78.3	
% Orig. prod. in final peroxide ppt. 1FP**	87.6									

Material Balance

Run Number	218-226	218	219	220	221	222	223	224	225	226
Through 1st by-prod. ppt. 51R	105.6	101.3	108.3	121.2	101.6	109.6	112.1	99.5	98.7	105.4
Through 2nd by-prod. ppt. 41R	104.0	92.3	131.1	108.8	91.2	113.8	113.6	85.8	109.5	102.8
Through decont. cycles 44P	100.5	103.8	111.9	80.5	106.5	110.1	105.4	91.8	95.4	97.2
Through final peroxide ppt. 1FP**	101.4									

Individual Run Summaries

Run Numbers	218	219	220	221	222	223	224	225	226
Date Started	9-14	9-14	9-15	9-16	9-17	9-18	9-19	9-19	9-20
Age metal in days	36	36	37	38	39	39	40	36	37
Gamma counts per gram UNH x 10^6	2.11	2.30	1.81	2.59	1.83	1.73	2.10	1.80	1.56

*151R and D1P for runs containing recycled product are based on the average value of the 11M plus the amount of recycled product added.

**Corrected for gain in product content of recycle solutions on hand and based on total 11M.

[redacted]

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Average Waste Losses with Scavengers Tested

Run No.	186-193	194-201	202-209	210-217	218-226
Scavengers 1st cycle	Ce-Zr; Ce-Zr	Ce-Zr; Ce	Ce-Zr; Ce	Ce-Zr; Ce-Zr	Ce-Zr; Ce-Zr, $(NH_4)_2SiF_6$
2nd cycle	Ce-Zr; Ce-Zr	Ce-Zr; Ce	$(NH_4)_2SiF_6$	Ce-Zr; Ce-Zr	$(NH_4)_2SiF_6$
1st by-product cake 71-BP-1	3.7	2.9	3.3	3.7	3.4
1st prod. ppt. effluent 53WS	2.3	1.0	0.7	3.2	1.1
2nd by-prod. cake 71-BP-2	4.4	3.0	0.7	3.9	0.9
2nd prod. ppt. effluent 43WS	2.1	0.8	0.2	0.8	0.6
Total	12.5	7.7	4.9	11.6	6.0

Measured Losses

Run No.	218-226	218	219	220	221	222	223	224	225	226
Extr. ppt. effluent 23MS	1.5	1.1	1.1	2.3	1.3	2.6	2.2	1.2	1.7	0.5
1st by-product cake 71-BP-1	3.4	1.4	4.2	3.6	3.0	4.5	4.4	3.1	3.9	3.5
1st prod. ppt. effluent 53WS	1.1	1.1	1.9	2.0	0.3	2.6	0.3	0.4	1.0	0.4
2nd by-prod. cake 71-BP-2	0.9	0.4	2.3	1.0	0.3	0.5	0.1	0.3	0.2	4.1
2nd prod. ppt. effluent 43WS	0.6	1.5	1.4	1.2	0.1	0.2	0.5	0.1	0.1	0.3
3rd by-product cake 71-BP-3	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.3
LaF_3 by-product cake 71-BP-4*	1.5	2.2	1.4	1.6	1.1	2.4	2.1	1.2	2.4	1.3
LaF_3 product ppt. effluent 153WS*	1.3	0.7	0.7	0.5	0.4	0.6	1.1	0.8	2.3	2.3
1st metathesis liquor D3CW*	0.4		0.5			0.2			0.6	
1st metathesis wash D3WW*	0.5		0.7			0.5			0.4	
Total 205 Building (Basis 11M)	13.8									

*BP-4, 153WS, D3CW and D3WW for runs containing recycled product are based on the average value of the 11M plus the amount of recycled product added.

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Decontamination with Scavengers Tested

Run Number	186-193	194-201	202-209	210-217	218-226
Scavengers 1st cycle	Ce-Zr; Ce-Zr	Ce-Zr; Ce	Ce-Zr; Ce	Ce-Zr; Ce-Zr	Ce-Zr; Ce-Zr, $(NH_4)_2SiF_6$
2nd cycle	Ce-Zr; Ce-Zr	Ce-Zr; Ce	$(NH_4)_2SiF_6$	Ce-Zr; Ce-Zr	$(NH_4)_2SiF_6$
Through extr. ppt. 24P	0.8	0.8	1.0	0.9	0.9
Through 1st by-pr. ppt. 51R	2.4	2.3	2.2	2.1	2.2
Through 1st prod. ppt. 54P	3.7	3.5	3.7	3.7	3.7
Through 2nd by-prod. ppt. 41R	3.8	4.0	3.8	4.1	3.9
Through 2nd prod. ppt. (composite) 45P	5.6	5.3	5.3	5.8	5.7
Through LaF_3 prod. slurry D1-S	6.3	6.7	7.1	7.0	7.4

Gamma dF's

Run Number	218-226	218	219	220	221	222	223	224	225	226
Through extr. ppt. 24P	0.9	0.9	0.9	0.8	1.0	0.8	1.0	0.9	0.8	0.8
Through 1st by-pr. ppt. 51R	2.2	2.2	2.2	---	2.6	2.1	2.2	2.1	2.2	---
Through 1st prod. ppt. 54P	3.7	3.7	3.7	3.6	4.0	3.7	3.6	3.7	3.7	3.7
Through 2nd by-prod. ppt. 41R	3.9	3.8	3.9	4.2	4.1	3.8	3.7	3.8	3.8	4.2
Through 2nd prod. ppt. 44P	5.5	5.2	5.6	5.7	5.6	5.2	5.3	5.2	5.9	5.5
Through 2nd prod. ppt. (composite) 45P	5.7									
Through 2nd prod. ppt. D1-S	7.4	7.2			7.3			7.7		

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DISCUSSION

Extraction Waste Studies

Pre-extraction treatment studies were continued varying the $NaNO_2$ as follows: on the first three runs, 40% of the flowsheet amount (0.04M); on the next three runs, 100% excess added to the precipitator just prior to the strike (0.2M total); and on the last three runs, 25% of the $NaNO_2$ (0.025M). Extraction losses for these tests averaged 1.5, 2.0 and 1.1% respectively. An average of 2.2% was obtained on the four runs of the previous series using double the amount of $NaNO_2$ (0.2M) added in the dissolver. On 16 representative runs (194 - 209) using 0.1M $NaNO_2$ the losses averaged 2.2, therefore, on the basis of these few runs, it is possible that lower concentrations might be desirable.

Scavengers

Decontamination on this series was assisted by the following combination of scavengers and complexing agent:

First cycle by-product pptn. - Ce-Zr; Ce-Zr
product pptn. - $(NH_4)_2SiF_6$

Second cycle by-product pptn. - no scavengers
product pptn. - $(NH_4)_2SiF_6$

Decontamination through the LaF_3 product slurry (D1-S) was the best obtained thus far and averaged 7.4 (dF) as compared to about 7.0 for previous combinations, while the dF at the end of the two cycles was 5.7 - well above the goal of 5.0. The waste losses were nearly as low as the best of the previous combinations: 6.0 for this combination against 4.9 for the combination Ce-Zr; Ce 1st cycle, $(NH_4)_2SiF_6$ 2nd cycle (extraction losses excluded). The results that have been obtained with scavengers and complexing agent indicate waste losses would be much lower and possibly still obtain sufficient decontamination for Hanford operations by using $(NH_4)_2SiF_6$ in both cycles with no scavengers.

Recycling of Peroxide Supernatants

Since the peroxide supernatants from the isolation step were introduced in the LaF_3 by-product precipitation step of the cross-over cycle, it was necessary to decompose the H_2O_2 contained in these solutions before addition to the process. This was done in Room D as follows:

> To 100 volumes of supernatant in tank D-8 cooled as low as possible (about 19° C.) add 13 volumes of 60% HNO_3 (to make at least 1N) and then 17% $NaNO_2$ solution at a rate such that the temperature does not exceed 30° C. When about 65% of the $NaNO_2$ necessary to decompose the peroxide (peroxide content previously determined by analysis) has been added, remove a sample to ascertain if the peroxide has been all decomposed. If not, add more nitrite and resample. After the end-point has been passed, add a small amount of $KMnO_4$ solution until a permanent pink color appears.

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The reaction has been quite smooth with no unusual evolution of gas and has given about 9° C. temperature rise over the 1 hour and 20 minute $NaNO_2$ addition period. Only 60 - 65% of the stoichiometric amount of $NaNO_2$ has been required for the completion of the reaction.

After the above treatment, the supernatant was divided into two portions and used to furnish the lanthanum for the first shot of the by-product precipitations of the last two runs of the three-run batches. The first recycling in this series was done on the second three-run batch instead of the first so that two recycle solutions would be available, thus minimizing the possibility of process delays. The recycle was added before the $KMnO_4$ reoxidation and consequently the first lanthanum by-product precipitate was co-formed instead of preformed. By-product waste losses on runs containing recycled product were about 1% higher than normal while those from the product precipitation were variable so that no definite conclusions can be drawn on this step. The average was also about 1% higher than that for runs with no recycled product. Some of the product effluent waste samples of the next series of runs have been centrifuged in the laboratory with almost complete removal of the product. This definitely indicates that losses were due to inefficient centrifugation rather than incomplete reduction or carrying of the product. The table below shows the results of these tests.

Laboratory Centrifugation of 153WS Samples

Run No.	227	228	229	231	232
As received	2.3	0.4	1.3	1.1	2.7
After laboratory Centrifugation	0.0001	0.07	0.02	0.3	0.07

Reworking of Metathesis Caustic Wastes

On the basis of experience gained in the reworking of $KOH-K_2CO_3$ metathesis wastes in the two previous series, the following procedure was incorporated:

1. Centrifuge in regular manner after $KOH-K_2CO_3$ treatment.
2. Add 25 lbs. of 1% La solution and centrifuge again.
3. Recentrifuge, if necessary.

Results were fairly good after the additional precipitation and centrifugation (1.3%). However, since the time was available, the effluent on each run was recentrifuged which decreased these waste losses to an average of 0.5%.

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Isolation

High peroxide solubilities were encountered on these runs with no apparent explanation; however, variations in the iron, zirconium, acid and peroxide concentrations are being considered. Solubilities, along with these variables are shown in the table below. The solution for the final H_2O_2 precipitation was divided into two portions and each run separately under the same conditions. Solubilities after decantation and washing were 53 mg/liter and 20 mg/liter. Probably the washing technique was the cause of the different results obtained.

Run Nos.	Fe (M)	Zr (M)	Acidity (N)	H_2O_2 (%)	Solubility mg/liter
218-219-220	0.008	0.00040	0.72	---	No pptn. (133 by fortifying)
221-222-223	0.005	0.00006	0.83	9.4	83
224-225-226	0.005	0.00004	0.80	9.1	64

W. Q. Smith

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For The Atomic Energy Commission
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To: J. P. Sinclair — Department: Operating

From: W. Q. Smith — Department: Operating

In re: SUMMARY OF RUNS 210 - 217 THROUGH DECONTAMINATION CYCLES

This series of runs will complete the special isolation test started with the previous series. Results presented here are through the decontamination cycles for this series. After completion of the isolation test, final results for both series will be reported.

Cerium-zirconium, cerium-zirconium scavengers were used for decontamination in both cycles. Results were essentially the same as those obtained from the 60-day metal runs 186 - 193 which were processed with the same scavengers.

A number of changes in the extraction procedure are being tried in order to improve waste losses in this cycle. On the first four runs of this series, a two hour direct strike using 90% of the bismuth solution followed by a thirty minute indirect strike with the remaining bismuth solution was used. On the last four runs, the sodium nitrite for pre-extraction treatment was doubled. Waste losses in neither case showed a significant change. In the next series, 40% of the sodium nitrite will be used on four runs and then on the last four, 100% excess nitrite will be added in the precipitation immediately prior to the strike.

A table comparing the three decontamination procedures that have been used is given on Page 3 and an iron balance from crossover through solution of the crossover precipitates is given on Page 4.

This document has been approved for release to the public by:

David R Hamrin 9/15/95
Technical Information Officer — Date
ORNL Site

W. Q. Smith
W. Q. Smith

WQS/maw

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Individual Run Summaries

Run numbers	210	211	212	213	214	215	216	217
Date started	8-28	8-29	8-29	8-31	8-31	9-1	9-3	9-3
Age of metal in days	39	40	40	42	42	43	41	41
Beta counts per gram UNH X 10^8	4.47	5.01	5.38	5.78	4.63	4.47	5.95	4.83
Gamma counts per gram UNH X 10^6	1.58	1.70	1.37	1.82	1.63	1.52	1.62	1.39

Yield

Run numbers	210-217	210	211	212	213	214	215	216	217
% Orig.prod.in extr.ppt.(24P)	98.2	98.7	87.7	102.7	100.0	105.6	102.7	92.9	96.4
% Orig.prod.after 1st by-pr.ppt.(51R)	108.5	108.8	96.4	116.0	113.0	110.4	114.4	101.8	109.0
% Orig.prod.in 1st pr.ppt.(54P)	93.6	90.4	88.8	101.8	90.6	90.3	99.6	95.9	95.5
% Orig.prod.after 2nd by-pr.ppt.(41R)	96.0	90.9	87.6	101.8	93.4	99.7	94.0	97.0	105.7
% Orig.prod.in 2nd pr.ppt.(44P)	91.7	90.9	84.2	91.0	96.7	92.0	90.0	89.1	95.9

Measured Losses

Run numbers	210-217	210	211	212	213	214	215	216	217
Extr.ppt.effluent (23MS)	1.9	1.8	2.0	1.3	1.7	1.4	2.4	1.3	3.8
1st By-prod.cake (71-BP-1)	3.7	3.4	2.7	3.4	4.0	3.7	4.9	3.9	4.5
1st Prod.ppt.effluent (53MS)	3.2	4.7	4.0	2.4	3.8	2.8	3.0	1.7	2.1
2nd By-prod.cake (71-BP-2)	3.9	4.2	4.4	3.8	4.3	3.2	3.4	3.8	3.4
2nd Prod.ppt.effluent (43MS)	0.8	0.9	1.1	1.1	0.6	0.7	0.8	1.0	0.5
Total wastes thru decont.cycles	13.5	14.9	14.1	12.0	14.4	11.9	14.5	11.4	14.4

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Percent Material Balance

Run number	210-217	210	211	212	213	214	215	216	217
Thru 1st by-pr.ppt.(51R)	114.1	114.0	101.1	120.5	118.7	115.5	121.7	107.0	117.3
Thru 2nd by-pr.ppt.(41R)	108.8	107.8	100.6	113.6	107.2	110.8	107.7	107.7	119.6
Thru sol.of 2nd prod.ppt.(44P)	105.2	105.8	98.4	105.4	111.1	105.9	104.6	100.4	110.3

Gamma dF

Run number	210-217	210	211	212	213	214	215	216	217
Thru extr.ppt.(24P)	0.9	0.8	0.8	0.9	0.9	1.1	0.9	1.1	0.8
Thru 1st by-pr.ppt.(51R)	2.1	2.1	2.0	2.0	1.9	2.1	2.2	2.1	2.1
Thru 1st prod.ppt.(54P)	3.7	3.7	3.5	3.8	3.5	3.9	3.9	3.8	3.5
Thru 2nd by-pr.ppt.(41R)	4.1	4.1	4.1	3.9	4.2	4.4	4.1	3.6	4.6
Thru 2nd prod.ppt.(44P)	6.0	6.1	5.9	6.1	5.6	5.9	6.0	6.2	6.2
Composite of 2nd prod.ppt.(45P)	5.8								

Comparison of Decontamination Processes

Run numbers	186-193	194-201	202-209	210-217
Process used	Ce-Zr, Ce-Zr both cy.	Ce-Zr, Ce both cy.	Ce-Zr, Ce 1st; $(NH_4)_2SiF_6$ 2nd	Ce-Zr, Ce-Zr both cy
Total wastes (Extract.wastes excluded)	12.4	7.6	5.0	11.6
Decontamination (G dF thru 45P)	5.6	5.3	5.3	5.8

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IRON BALANCE IN CROSSOVER

Runs 202 and 203

Iron in 45P	288 gm.	
Iron in chemicals added	2	
Total in		290 gm.
Iron in wastes (71-BP-3 & 4)	90	
Iron in 151R	160	
Total out		250
Unaccounted for loss thru the two crossover by-prod. pptns.		40
Iron in 151R	160	
Iron in chemicals added	1	
Total in		161
Iron in waste (153W)	517	
Iron in slurry (½ D1-S)	11	
Total out		528
Unaccounted for gain thru Cell 5		367

This large gain is probably largely due to the corrosion of the un-heat-treated welds made in forming the bends in the line from the centrifuge to the catch tank. This line has been replaced by a cold bent line, thus eliminating all but the flange welds.

Iron in D1-S (2 chgs.)	21 gm.	
Iron in KOH	6	
Iron in other chemicals	1	
Total in		28 gm.
Iron in wastes (D3C.)	12	
(D3W)	1	
Iron in cake soln.	20	
Total out		33
Unaccounted for gain thru LaF_3 cake soln.		5

The KOH-K_2CO_3 metathesis appears to aid in the removal of iron carried in from Cell 5. The quantity carried in from Cell 5 can be expected to decrease with the use of the new line in Cell 5. The iron in the KOH will be decreased to about 1/8 of the above value by the use of a purer material.

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